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May 9, 1958

Dear Sir:

This is the first letter report on Task Order No. V and it describes the activity during the period from March 24 to April 25, 1958.

During this first month, the design studies for the modifications and additions to the Type 1 Pipe-Pusher Kits were started. In addition, the unmodified parts for the two pipe-pusher kits being fabricated under this program were completed.

On January 21, 1958, a meeting was held with the Sponsor to discuss the results of his field testing of the Type 1 Pipe-Pusher Kits prepared under Task Order No. N. At that time, the Sponsor suggested that two more pipe-pusher kits be fabricated and that they include certain modifications and additions. This effort was subsequently initiated under Task Order No. V.

The recommended changes which are to be investigated and ultimately, if possible, incorporated in the pipe-pusher kits are as follows:

- (1) Enlarge the ID of the pipe-section bushings and nipples to allow for the passage of three to six strands of selected wire.
- (2) Revise the method of coupling the pipe sections.
- (3) Study methods of keeping the pipe from bending while being pushed.

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- (4) Change the method of attaching the nose point, so that the pipe sections will be interchangeable.
- (5) Improve the coupling between the wire and the nylon cord.
- (6) Increase the tolerance between the pipe jaw block and the pipe.
- (7) Design new small tools - a spade and a pick.
- (8) Design an anchor or support, so that the pusher could be operated easily in an open basement. The anchor or support should be attachable to either the floor or the wall.
- (9) Procure or develop a tool for determining the angle at which a pipe must be pushed into the ground from a basement in order to reach a desired end point.
- (10) Develop a method of locating the nose point of the pipe underground after pushing.

On April 25, the below-described results of the effort performed were discussed with the Sponsor. In connection with Items 1, 2, and 3, the bushings and nipples used in the Type 1 unit were eliminated by a change in coupling design, and extra-heavy pipe was substituted for the standard pipe so as to obtain increased strength and resistance to bending. Two coupling designs, a straight and a tapered type, were prepared. Both types of couplings

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will be fabricated and performance tested. The nose point (Item 4) was redesigned to fit the new coupling designs, thus eliminating the need for the leading pipe section (i.e., the one that carries the nose point) being different from the other pipe sections.

A new connector (Item 5) was designed that can be used to attach from 1 to 6 strands of wire to the nylon cord. Further connector studies will be made if it is decided that multiple-wire cable is to be used in place of the single wires.

A series of tests was made to study the effect of increasing the tolerance between the pipe and pipe jaw block (Item 6). The results showed that the operation of the pusher was not impaired when the tolerance was increased by 1/16 inch.

Since it has been established that the pipe pusher will not necessarily be used in a machine-dug trench, tools are to be supplied with the kit to facilitate manual digging of a trench for operating the pusher. Item 7 constitutes the preparation of two new manual-digging tools - a spade and a pick. The Sponsor has indicated that a trench 3 inches wide and 15 inches deep would be satisfactory for this purpose. The design of the manual-trenching tools was started.

A design for an anchor or support (Item 8) was completed and an experimental steel model fabricated. The anchor is in the form of a tripod which can be fastened to either the floor or the

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wall of a basement. After evaluation tests are made with this experimental anchor, an aluminum-alloy model will be fabricated for the pipe-pusher kit. It is expected that the aluminum-alloy anchor will add only approximately 6 pounds to the weight of the pipe-pusher kit.

No work has been yet done on Item 9. However, in this connection, the Sponsor has suggested that we investigate the adaptation of a gunner's quadrant to the pipe-pushing operation.

We investigated two possible methods of locating the front end of the pipe underground after the pushing operation has been completed (Item 10). One method involves the introduction of an audio frequency into the pusher end of the pipe while the surface of the ground is scanned with a microphone and high-gain amplifier in attempt to locate the front end of the pipe. Experiments with this method provided results which were not promising. The other method studied was similar to the first, except that the pick up used was an induction coil rather than a microphone. Further studies will be made using the second method. Also, at the Sponsor's suggestion, a commercial locator unit will be purchased and evaluated.

In addition to the above, all of the unmodified parts for the two pipe-pusher kits being fabricated under this program were completed. These included the pusher-handle assembly except for the pipe jaw block, the handle-extension assembly, and the pusher base assembly.

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During the coming month, the modification and new-tool studies will be continued and experimental modified parts will be fabricated and tested.

The original appropriation on this Task Order was \$10,261. As of May 1, 1958, the unexpended balance was approximately \$6,250.

Sincerely,

  
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ABW:mlm

In Duplicate

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